8. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding stable iodine in air, water, and other media are summarized in Table 8-1. The regulations regarding radioactive iodine are summarized in Tables 8-2 and 8-3.

No MRLs were derived for inhalation exposure to stable or radioactive iodine. Oral MRLs of 0.01 mg/kg/day were derived for both acute- and chronic-duration exposures. No oral MRL was derived for intermediate-duration exposure.

The EPA has not classified iodine for human carcinogenicity, nor has the EPA derived reference concentrations (RfCs) or reference doses (RfDs) for stable or radioactive iodine (IRIS 2000).

Table 8-1. Regulations and Guidelines Applicable to Stable Iodine

Agency	Description	Information	References
INTERNATIONAL			
Guidelines:			
IARC	Carcinogenicity classification	No data	
NATIONAL			
Regulations and Guidelines:			
a. Air			
ACGIH	STEL (ceiling)	0.1 ppm	ACGIH 2000
NIOSH	REL (ceiling) IDLH	0.1 ppm 2.0 ppm	NIOSH 2001
OSHA	PEL (ceiling)—general industry	0.1 ppm	OSHA 2001b 29CFR1910.1000
	PEL (ceiling)—construction industry	0.1 ppm	OSHA 2001a 29CFR1926.55
	PEL (ceiling)—shipyard industry	0.1 ppm	OSHA 2001c 29CFR1915.1000
b. Water			
EPA	Effluent limitation guidelines; inorganic chemicals manufacturing point source category for iodine production	Effluent reduction attainable by the application of BPT; no discharge of process wastewater pollutants to navigable waters	EPA 2001b 40CFR415.432
c. Food			
FDA	Drug products containing certain active ingredients offered over-the-counter for certain uses	Digestive aid and weight control drug product	FDA 2000a 21CFR310.545
	Drugs; recommended warning and caution statements—iodine and iodides (oral)	If a skin rash appears, discontinue use and consult physician	FDA 2000b 21CFR369.20
	Food additives permitted for direct addition to food for human consumption (as potassium iodide) Total amount for foods labeled without reference to age or physiological state	 225 μg	FDA 2000c 21CFR172.375
	Food additives permitted for direct addition to food for human consumption (as potassium iodide) Infants Children under 4 years of age Adults and children 4 or more years of age Pregnant or lactating women	 45 μg 105 μg 225 μg 300 μg	FDA 2000c 21CFR172.375
	Food labeling—RDI	150 μg	FDA 2001b 21CFR101.9

Table 8-1. Regulations and Guidelines Applicable to Stable Iodine

Agency	Description	Information	References
NATIONAL *(cont.)*			
FDA	Indirect food additives; sanitizing solutions	Aqueous solution used on food and dairy processing equipment and utensils	FDA 2000d 21CFR178.1010 (b)(40)
	Nutrients—minimum amount per 100 kilocalories	5.0 μg	FDA 2001a
	Nutrition labeling of dietary supplements		FDA 2000e 21CFR101.36
	Nutritional quality guidelines RDI[a] Amount per 100 calories[b]	 150 μg 7.5 μg	FDA 2000f 21CFR104.20 (d)(3)
	Trace minerals added to animal feeds—calcium iodate, calcium iodobehenate, cuprous iodide, 3,5-diiodosalicylic acid, ethylenediamine dihydroiodide, potassium iodate, potassium iodide, sodium iodate, sodium iodide, and thymol iodide	Recognized as safe when added at levels consistent with good feeding practice	FDA 2000i 21CFR582.80
d. Other			
ATF	List of denaturants authorized for denatured spirits		ATF 2001a 27CFR21.151
	List of products and processes using specially denatured alcohol and rum, and authorized formula		ATF 2001b 27CFR21.141
USC	List II chemical—regulated by the Attorney General as a chemical used in manufacturing a controlled substance		USC 2001 21USC802
STATE Regulations and Guidelines:			
a. Air			
Alaska	PEL (ceiling)	0.1 ppm	BNA 2001h
California	Airborne contaminant		BNA 2001h
	HAP		BNA 2001h
Hawaii	Air contaminant		BNA 2001h
Idaho	Toxic air pollutants OEL EL AAC (24-hour average)	 0.1 mg/m^3 $6.7x10^{-3}$ pounds/hour $5x10^{-3}$ mg/m^3	BNA 2001h
Michigan	Occupational air contaminant; maximum allowable concentrations	0.1 ppm	BNA 2001h
	Limits for air contaminants PEL (ceiling)	 0.1 ppm	BNA 2001h

Table 8-1. Regulations and Guidelines Applicable to Stable Iodine

Agency	Description	Information	References
STATE *(cont.)*			
Montana	Occupational air contaminant		BNA 2001h
	TLV	0.1 ppm	
New Hampshire	Regulated toxic air pollutant		BNA 2001h
	OEL	1 mg/m^3	
New Mexico	Toxic air pollutant and emissions		BNA 2001h
	OEL	0.1 ppm	
	Emissions	$6.67x10^{-2}$ pounds/hour	
New York	Exposure limits		BNA 2001h
	PEL (ceiling)	0.1 ppm	
Oregon	Air contaminant		BNA 2001h
	PEL (8-hour TWA)	0.1 ppm	
Texas	Airborne contaminant		BNA 2001h
Vermont	Hazardous air contaminant		BNA 2001h
	Hazardous air contaminants that cause short-term irritant effects		BNA 2001h
	Annual average	100 $\mu g/m^3$	
	Averaging time	8 hours	
	Action level	4.2 pounds/8 hours	
Washington	Toxic air pollutant and acceptable source impact levels	3.3 $\mu g/m^3$ per 24-hour average	BNA 2001h
b. Water			
Maine	Drinking water guideline—iodide ion	340 $\mu g/L$	HSDB 2001
Rhode Island	Water resources—toxic pollutant		BNA 2001h
c. Food		No data	
d. Other			
California	Hazardous substance list		BNA 2001h
Florida	Toxic substance in the workplace		BNA 2001h
Massachusetts	Oil and hazardous material list		BNA 2001h
Pennsylvania	Worker and Community Right-to-Know Act—hazardous substance list		BNA 2001h

[a]RDI for adults and children 4 or more years of age
[b]100 calories, based on 2,000 calorie intake as a daily standard

AAC = acceptable ambient concentrations; ACGIH = American Conference of Governmental Industrial Hygienists; ATF = Alcohol, Tobacco, and Firearms; BPT = best practicable control technology; BNA = Bureau of National Affairs; CFR = Code of Federal Regulations; EL = emissions level; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; HAP = hazardous air pollutant; HSDB = Hazardous Substances Data Bank; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life and health; NIOSH = National Institute of Occupational Safety and Health; OEL = occupational exposure limit; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; RDI = recommended daily intake; REL = relative exposure limit; STEL = short term exposure limit; TLV = threshold limit value; TWA = time weighted average; USC = United States Code

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information		References
INTERNATIONAL Guidelines:				
IARC	Carcinogenicity classification	No data		
ICRP	Occupational recommended dose limits[a]; effective dose	20 mSv per year, averaged over defined period of 5 years[b]		ICRP 1991
	Annual equivalent dose			
	Lens of the eye	150 mSv		
	Skin[c]	500 mSv		
	Hands and feet	500 mSv		
	General population recommended dose limits[a]			ICRP 1991
	Effective dose	1.0 mSv per year[d]		
	Annual equivalent dose			
	Lens of the eye	15 mSv		
	Skin[c]	50 mSv		
	Hands and feet	No data		
NATIONAL Regulations and Guidelines:				
a. Air				
ACGIH	Effective dose			ACGIH 2000
	Any single year	50 mSv		
	Averaged over 5 years	20 mSv		
	Annual equivalent dose to			
	Lens of the eye	150 mSv		
	Skin	500 mSv		
	Hands and feet	500 mSv		
	Embryo-fetus exposures once the pregnancy is known			
	Monthly equivalent dose	0.5 mSv		
	Dose to the surface of women's abdomen (lower trunk)	2 mSv for the remainder of the pregnancy		
	Intake of radionuclide	1/20 ALI		
NIOSH	REL	No data		
USNRC	Occupational values—inhalation	ALI (μCi)	DAC[e] (μCi/mL)	USNRC 2001a 10CFR20, Appendix B
	^{120}I	$1x10^{4}$	$4x10^{-6}$	
	^{120m}I	$2x10^{4}$	$9x10^{-6}$	
	^{121}I	$5x10^{4}$	$8x10^{-6}$	
	^{123}I	$6x10^{3}$	$3x10^{-6}$	
	^{124}I	$3x10^{2}$	$3x10^{-8}$	
	^{125}I	$2x10^{2}$	$3x10^{-8}$	
	^{126}I	$1x10^{2}$	$1x10^{-8}$	
	^{128}I	$1x10^{5}$	$5x10^{-5}$	

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information		References
NATIONAL *(cont.)*				
USNRC *(cont.)*	Occupational values—inhalation	ALI (μCi)	DAC[e] (μCi/mL)	USNRC 2001a
	^{129}I	$3x10^{1}$	$4x10^{-9}$	10CFR20,
	^{130}I	$2x10^{3}$	$3x10^{-7}$	Appendix B
	^{131}I	$2x10^{2}$	$2x10^{-8}$	
	^{132}I	$1x10^{4}$	$3x10^{-6}$	
	^{132m}I	$2x10^{4}$	$4x10^{-6}$	
	^{133}I	$9x10^{2}$	$1x10^{-7}$	
	^{134}I	$5x10^{4}$	$2x10^{-5}$	
	^{135}I	$4x10^{3}$	$7x10^{-7}$	
	Effluent concentrations (μCi/mL)			USNRC 2001a
	^{120}I	$2x10^{-8}$		10CFR20,
	^{120m}I	$3x10^{-8}$		Appendix B
	^{121}I	$7x10^{-8}$		
	^{124}I	$4x10^{-10}$		
	^{125}I	$3x10^{-10}$		
	^{126}I	$2x10^{-10}$		
	^{128}I	$2x10^{-7}$		
	^{129}I	$4x10^{-11}$		
	^{130}I	$3x10^{-9}$		
	^{131}I	$2x10^{-10}$		
	^{132}I	$2x10^{-8}$		
	^{132m}I	$3x10^{-8}$		
	^{133}I	$1x10^{-9}$		
	^{134}I	$6x10^{-8}$		
	^{135}I	$6x10^{-9}$		
OSHA	PEL (8-hour TWA)	No data		
b. Water				
USNRC	Effluent concentrations (μCi/mL)			USNRC 2001a
	^{120}I	$1x10^{-4}$		10CFR20,
	^{120m}I	$2x10^{-4}$		Appendix B
	^{121}I	$4x10^{-4}$		
	^{124}I	$2x10^{-6}$		
	^{125}I	$2x10^{-6}$		
	^{126}I	$1x10^{-6}$		
	^{128}I	$8x10^{-4}$		
	^{129}I	$2x10^{-7}$		
	^{130}I	$2x10^{-5}$		
	^{131}I	$1x10^{-6}$		
	^{132}I	$1x10^{-4}$		
	^{132m}I	$1x10^{-4}$		
	^{133}I	$7x10^{-6}$		
	^{134}I	$4x10^{-4}$		
	^{135}I	$3x10^{-5}$		
	Releases to sewers; monthly average concentration (μCi/mL)			USNRC 2001a 10CFR20,
	^{120}I	$1x10^{-3}$		Appendix B
	^{120m}I	$2x10^{-3}$		
	^{121}I	$4x10^{-3}$		
	^{124}I	$2x10^{-5}$		

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information	References
NATIONAL *(cont.)*			
USNRC *(cont.)*	Releases to sewers; monthly average concentration (μCi/mL)		USNRC 2001a 10CFR20, Appendix B
	^{125}I	$2x10^{-5}$	
	^{126}I	$1x10^{-5}$	
	^{128}I	$8x10^{-3}$	
	^{129}I	$2x10^{-6}$	
	^{130}I	$2x10^{-4}$	
	^{131}I	$1x10^{-5}$	
	^{132}I	$1x10^{-3}$	
	^{132m}I	$1x10^{-3}$	
	^{133}I	$7x10^{-5}$	
	^{134}I	$4x10^{-3}$	
	^{135}I	$3x10^{-4}$	
c. Food			
FDA	Derived intervention level[f] (DIL; Bq/kg food) for ^{131}I in accidentally-contaminated human food	167	FDA 1998
	Sources of radiation used for food inspection; sealed units producing radiation (^{125}I)	Not more than 2.2 million electron volts	FDA 2000h 21CFR179.21
	Requirements regarding certain radioactive drugs (^{131}I)	Diagnosis of thyroid functions; thyroid scans; treatment of hyper-thyroidism and/or cardiac dysfunction; treatment of thyroid carcinoma	FDA 2000g 21CFR310.503
d. Other			
DOE	Radiation standards; DAC[g] for controlling radiation exposure to workers at DOE facilities[h](μCi/mL)		DOE 2001b 10CFR835, Appendix A
	^{120m}I	$9x10^{-6}$	
	^{120}I	$4x10^{-6}$	
	^{121}I	$7x10^{-6}$	
	^{123}I	$3x10^{-6}$	
	^{124}I	$3x10^{-8}$	
	^{125}I	$3x10^{-8}$	
	^{126}I	$1x10^{-8}$	
	^{128}I	$5x10^{-5}$	
	^{129}I	$4x10^{-9}$	
	^{130}I	$3x10^{-7}$	
	^{131}I	$2x10^{-8}$	
	^{132m}I	$4x10^{-6}$	
	^{132}I	$3x10^{-6}$	
	^{133}I	$1x10^{-7}$	
	^{134}I	$2x10^{-5}$	
	^{135}I	$7x10^{-7}$	

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information		References
NATIONAL *(cont.)*				
DOE	Radiation standards; DAC[g] for workers from external exposure during immersion in contaminated atmospheric cloud (Ci/mL)			DOE 2001a 10CFR835, Appendix C
	^{122}I	$5x10^{-6}$		
	^{128}I	$5x10^{-5}$		
	^{132}I	$2x10^{-6}$		
	^{134}I	$1x10^{-6}$		
	^{135}I	$7x10^{-7}$		
	^{136}I	$1x10^{-6}$		
	Values for establishing sealed radioactive source accountability and radioactive material posting and labeling requirements			DOE 2001c 10CFR835, Appendix E
	^{125}I	$3.5x10^{2}$		
	^{129}I	$1.8x10^{2}$		
DOT	General requirements for shipments and packagings; A1 and A2 values for radionuclides	A1 (Ci)	A2 (Ci)	DOT 2001a 49CFR173.435
	^{123}I	6	162	
	^{124}I	0.9	24.3	
	^{125}I	2	54.1	
	^{126}I	0.9	24.3	
	^{129}I	Unlimited	Unlimited	
	^{131}I	0.5	13.5	
	^{132}I	0.4	10.8	
	^{133}I	0.5	13.5	
	^{134}I	0.3	8.11	
	^{135}I	0.3	13.5	
	Hazardous substance and reportable quantity (Ci)			DOT 2001b 49CFR171.101, Appendix A
	^{120}I	10		
	^{120m}I	100		
	^{121}I	100		
	^{123}I	10		
	^{124}I	0.1		
	^{125}I	0.01		
	^{126}I	0.01		
	^{128}I	1,000		
	^{129}I	0.001		
	^{130}I	1.0		
	^{131}I	0.01		
	^{132}I	10		
	^{132m}I	10		
	^{133}I	0.1		
	^{134}I	100		
	^{135}I	10		

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information			References
NATIONAL *(cont.)*					
EPA	Annual possession quantities for environmental compliance (Ci/year)	Gas	Liquid/ Solid	Powder	EPA 2001a 40CFR61, Appendix E
	^{123}I	4.9×10^{-1}	4.9×10^{5}	4.9×10^{2}	
	^{124}I	9.3×10^{-3}	9.3×10^{3}	9.3×10^{0}	
	^{125}I	6.2×10^{-3}	6.2×10^{3}	6.2×10^{0}	
	^{126}I	3.7×10^{-3}	3.7×10^{3}	3.7×10^{0}	
	^{128}I	9.3×10^{0}	9.3×10^{6}	9.3×10^{3}	
	^{129}I	2.6×10^{-4}	2.6×10^{2}	2.6×10^{-1}	
	^{130}I	4.6×10^{-2}	4.6×10^{4}	4.6×10^{1}	
	^{131}I	6.7×10^{-3}	6.7×10^{3}	6.7×10^{0}	
	^{132}I	2.0×10^{-1}	2.0×10^{5}	2.0×10^{2}	
	^{133}I	6.7×10^{-2}	6.7×10^{4}	6.7×10^{1}	
	^{134}I	3.2×10^{-1}	3.2×10^{5}	3.2×10^{2}	
	^{135}I	1.2×10^{-1}	1.2×10^{5}	1.2×10^{2}	
	Release limits for containment[i]				BNA 2001e 40CFR191, Appendix A
	^{129}I	100 Ci			
	Reportable quantity (Ci)				BNA 2001f 40CFR302.4, Appendix B
	^{120m}I	100			
	^{120}I	10			
	^{121}I	100			
	^{123}I	10			
	^{124}I	0.1			
	^{125}I	0.01			
	^{126}I	0.01			
	^{128}I	1,000			
	^{129}I	0.001			
	^{130}I	1.0			
	^{131}I	0.01			
	^{132m}I	10			
	^{132}I	10			
	^{133}I	0.1			
	^{134}I	100			
	^{135}I	10			
	Carcinogenicity slope factors[j]				EPA 2002b
	Ingestion—lifetime excess total cancer risk/pCi				
	Water				
	^{122}I	No data			
	^{123}I	6.96×10^{-13}			
	^{125}I	2.54×10^{-11}			
	^{126}I	8.73×10^{-11}			
	^{129}I	1.48×10^{-10}			
	^{130}I	6.36×10^{-12}			
	^{131}I	4.55×10^{-11}			
	^{132}I	8.44×10^{-13}			
	^{133}I	1.44×10^{-11}			
	^{134}I	2.50×10^{-13}			
	^{135}I	3.05×10^{-12}			

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information	References
NATIONAL *(cont.)*			
EPA *(cont.)*	Ingestion—lifetime excess total cancer risk/pCi		EPA 2002b
	Food		
	^{122}I	No data	
	^{123}I	2.05×10^{-12}	
	^{125}I	6.29×10^{-11}	
	^{126}I	2.48×10^{-10}	
	^{129}I	3.22×10^{-10}	
	^{130}I	1.88×10^{-11}	
	^{131}I	1.34×10^{-10}	
	^{132}I	2.34×10^{-12}	
	^{133}I	4.40×10^{-11}	
	^{134}I	6.44×10^{-13}	
	^{135}I	8.99×10^{-12}	
	Ingestion—lifetime excess total cancer risk/pCi		
	Soil		
	^{122}I	No data	
	^{123}I	1.96×10^{-12}	
	^{125}I	5.55×10^{-11}	
	^{126}I	2.31×10^{-10}	
	^{129}I	2.71×10^{-10}	
	^{130}I	1.80×10^{-11}	
	^{131}I	1.26×10^{-10}	
	^{132}I	2.22×10^{-12}	
	^{133}I	4.26×10^{-11}	
	^{134}I	5.96×10^{-13}	
	^{135}I	8.62×10^{-12}	
	Inhalation[k]—lifetime excess total cancer risk/pCi		
	^{122}I	No data	
	^{123}I	3.03×10^{-13}	
	^{125}I	1.06×10^{-11}	
	^{126}I	3.70×10^{-11}	
	^{129}I	6.07×10^{-11}	
	^{130}I	2.76×10^{-12}	
	^{131}I	1.95×10^{-11}	
	^{132}I	3.74×10^{-13}	
	^{133}I	6.25×10^{-12}	
	^{134}I	1.02×10^{-13}	
	^{135}I	1.34×10^{-12}	
	External exposure[l]—risk/year per pCi/g in soil		
	^{122}I	4.17×10^{-6}	
	^{123}I	5.10×10^{-7}	
	^{125}I	7.24×10^{-9}	
	^{126}I	1.96×10^{-6}	
	^{129}I	6.10×10^{-9}	
	^{130}I	9.67×10^{-6}	

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information		References
NATIONAL *(cont.)*				
EPA *(cont.)*	External exposure[l]—risk/year per pCi/g in soil			EPA 2002b
	^{131}I	1.59×10^{-6}		
	^{132}I	1.06×10^{-5}		
	^{133}I	2.72×10^{-6}		
	^{134}I	1.24×10^{-5}		
	^{135}I	7.83×10^{-6}		
NCRP	Occupational exposures[m]			NCRP 1993
	Effective dose limits			
	Annual	50 mSv		
	Cumulative	10 mSv x age		
	Equivalent dose annual limits for tissues and organs			
	Lens of eye	150 mSv		
	Skin, hands, and feet	500 mSv		
	Public exposures (annual)			
	Effective dose limit, continuous or frequent exposure[m]	1.0 mSv		
	Effective dose limit, infrequent exposure[m]	5 mSv		
	Equivalent dose limits for tissues and organs[m]			
	Lens of eye	15 mSv		
	Skin, hands, and feet	50 mSv		
USNRC	ALI (μCi)—oral ingestion			USNRC 2001a
	^{120}I	8×10^{3}		10CFR20,
	^{120m}I	1×10^{4}		Appendix B
	^{121}I	3×10^{4}		
	^{123}I	3×10^{3}		
	^{124}I	2×10^{2}		
	^{125}I	1×10^{2}		
	^{126}I	7×10^{1}		
	^{128}I	6×10^{4}		
	^{129}I	2×10^{1}		
	^{130}I	1×10^{3}		
	^{131}I	9×10^{1}		
	^{132}I	9×10^{3}		
	^{132m}I	1×10^{4}		
	^{133}I	5×10^{2}		
	^{134}I	3×10^{4}		
	^{135}I	3×10^{3}		
	Byproduct material listing (Ci)	Column I[n]	Column II[o]	USNRC 2001b
	^{125}I	0.1	0.00	10CFR33.100,
	^{126}I	0.1	0.001	Schedule A
	^{129}I	0.1	0.01	
	^{131}I	0.1	0.001	
	^{132}I	10	0.1	
	^{133}I	1.0	0.01	
	^{134}I	10	0.1	
	^{135}I	1.0	0.01	

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information			References
NATIONAL *(cont.)*					
USNRC	Individual monitoring ^{131}I	1.0 Ci			BNA 2001a 10CFR20.2206
	Laboratory testing and use ^{125}I and ^{131}I	≤10 μCi			BNA 2001b 10CFR32.71
	Packaging and transportation of radioactive material; determination of A1 and A2	A1 (Ci)	A2 (Ci)	Specific Activity	USNRC 2001c 10CFR71, Appendix A
	^{123}I	6.0	162	$1.9x10^6$	
	^{124}I	0.9	24.3	$2.5x10^5$	
	^{125}I	2.0	54.1	$1.7x10^4$	
	^{126}I	0.9	24.3	$8.0x10^4$	
	^{129}I	Unlimited	Unlimited	$1.8x10^4$	
	^{131}I	0.5	13.5	$1.2x10^5$	
	^{132}I	0.4	10.8	$1.0x10^7$	
	^{133}I	0.5	13.5	$1.1x10^6$	
	^{134}I	0.3	8.11	$2.7x10^7$	
	^{135}I	0.5	13.5	$3.5x10^6$	
	Quantities requiring consideration of the need for an emergency plan; ^{125}I and ^{131}I				BNA 2001c 10CFR30.72, Schedule C
	Release fraction	0.5%			
	Quantity	10 Ci			
	Standards for protection against radiation; quantities of licensed material requiring labeling (μCi)				BNA 2001d 10CFR20, Appendix C
	^{120m}I	1,000			
	^{120}I	100			
	^{121}I	1,000			
	^{123}I	100			
	^{124}I	10			
	^{125}I	1.0			
	^{126}I	1.0			
	^{128}I	1,000			
	^{129}I	1.0			
	^{130}I	10			
	^{131}I	1.0			
	^{132m}I	100			
	^{132}I	100			
	^{133}I	10			
	^{134}I	1,000			
	^{135}I	100			
	Waste classification Concentration of ^{129}I	0.08 Ci/m^3			USNRC 2001d 10CFR61.55
STATE Regulations and Guidelines:					
a. Air		No data			
b. Water					
Kentucky	Maximum groundwater contaminant level ^{131}I	3 pCi/L			BNA 2001h
c. Food		No data			

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information		References
d. Other				
Arkansas	Licensing of radioactive materials; exempt concentrations (Ci/mL, solids are Ci/g)	Column 1[n]	Column 2[o]	BNA 2001h
	^{126}I	$3x10^{-9}$	$6x10^{-4}$	
	^{131}I	$2x10^{-5}$	$1x10^{-8}$	
	^{132}I	$3x10^{-9}$	$7x10^{-5}$	
	^{133}I	$2x10^{-5}$	$2x10^{-7}$	
	^{134}I	$8x10^{-8}$	$1x10^{-3}$	
California	Licensing of radioactive materials; Schedule C (μCi/mL)	Column 1[n]	Column 2[o]	BNA 2001h
	^{126}I	$3x10^{-9}$	$2x10^{-5}$	
	^{131}I	$3x10^{-9}$	$2x10^{-3}$	
	^{132}I	$8x10^{-8}$	$6x10^{-4}$	
	^{133}I	$1x10^{-8}$	$7x10^{-3}$	
	^{134}I	$2x10^{-7}$	$1x10^{-3}$	
Florida	Quantities requiring consideration of the need for an emergency plan; ^{125}I and ^{131}I			BNA 2001h
	Release fraction	0.5%		
	Quantity	10 Ci		
Indiana	Licensing of radioactive materials; Schedule A; exempt concentrations (μCi/mL)	Column 1[n]	Column 2[o]	BNA 2001h
	^{126}I	$3x10^{-9}$	$2x10^{-5}$	
	^{131}I	$3x10^{-9}$	$2x10^{-3}$	
	^{132}I	$8x10^{-8}$	$6x10^{-4}$	
	^{133}I	$1x10^{-8}$	$7x10^{-3}$	
	^{134}I	$2x10^{-7}$	$1x10^{-3}$	
Kansas	Licensing of sources of radiation; Schedule B; exempt quantities of radioactive material (μCi)			BNA 2001h
	^{123}I	100		
	^{125}I	1.0		
	^{126}I	1.0		
	^{129}I	0.1		
	^{131}I	1.0		
	^{132}I	10		
	^{133}I	1.0		
	^{134}I	10		
	^{135}I	10		
Louisiana	Standards for protection against radiation			BNA 2001h
	^{120m}I	100		
	^{120}I	10		
	^{121}I	100		

Table 8-2. Regulations and Guidelines Applicable to Radioactive Iodine

Agency	Description	Information	References
STATE *(cont.)*			
Louisiana *(cont.)*	Standards for protection against radiation		BNA 2001h
	^{123}I	10	
	^{124}I	0.1	
	^{125}I	0.01	
	^{126}I	0.01	
	^{128}I	1,000	
	^{129}I	0.001	
	^{130}I	1.0	
	^{131}I	0.01	
	^{132m}I	10	
	^{132}I	10	

[a]The limits apply to the sum of the relevant doses from external exposure in the specified period and the 50-year committed dose (to age 70 years for children) from intakes in the same period.
[b]With the further provision that the effective dose should not exceed 50 mSv in any single year. Additional restrictions apply to the occupational exposure of pregnant women.
[c]The limitation on the effective dose provides sufficient protection for the skin against stochastic effects. An additional limit is needed for localized exposures in order to prevent deterministic effects.
[d]In special circumstances, a higher value of effective dose could be allowed in a single year, provided that the average over 5 years does not exceed 1.0 mSv per year.
[e]DAC is the concentration of radioactive material in air and the time of exposure to that radionuclide, in hours. An NRC licensee may take 2,000 hours to represent one ALI, equivalent to a committed effective dose equivalent of 5 rems (0.05 sievert).
[f]The FDA-recommended Derived Intervention Level (DIL) for radionuclides of ^{131}I, is defined as the DIL for the most sensitive age group (1 year) that was calculated from the most limiting Protective Action Goal (PAG; 50 mSv committed dose equivalent to the thyroid).
[g]DAC for the radionuclides listed in Appendix A of 10CFR835, the airborne concentration that equals ALI divided by the volume of air breathed by an average worker for a working year of 2,000 hours (assuming a breathing volume of 2,400 m^3). For the radionuclides listed in Appendix C of 10CFR835, the air immersion DACs were calculated for a continuous, non-shielded exposure via immersion in a semi-infinite atmospheric cloud.
[h]Class D: approximate length of retention in the pulmonary region is less than 10 days.
[i]Release limit per 1,000 metric tons of heavy metal or other unit of waste.
[j]Radioactive slope factors calculated by EPA's Office of Radiation and Indoor Air (ORIA). Slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity ingested, expressed as risk per picocurie (pCi).
[k]Inhalation slope factors are central estimates in a linear model of the age-average, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled, expressed as risk per picocurie (pCi).
[l]External slope factors are central estimates of the lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, expressed as risk/year per pCi per gram of soil.
[m]Sum of external and internal exposures but excluding doses from natural sources.
[n]Column 1: gas concentration
[o]Column 2: liquid and solid concentration

ACGIH = American Conference of Governmental Industrial Hygienists; ALI = annual limits on intake; BNA = Bureau of National Affairs; CFR = Code of Federal Regulations; DAC = derived air concentrations; DOE = Department of Energy; DOT = Department of Transportation; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; ICRP = International Commission on Radiological Protection; mSv = millisievert; NIOSH = National Institute of Occupational Safety and Health; NCRP = National Council on Radiation Protection; USNRC = U.S. Nuclear Regulatory Commission; OSHA = Occupational Safety and Health Administration; PAG = protective action guide; PEL = permissible exposure limit; REL = relative exposure limit; TLV = threshold limit value; TWA = time-weighted average

Table 8-3. Dose Coefficients[a] (e(50)) for Intakes of Iodine Radionuclides

Radionuclide	Half-life	f1[c]	Inhalation, 1μm AMAD[b] e(50)	Inhalation, 5μm AMAD e(50)	Ingestion e(50)
^{120}I	1.35/hour	1.0	1.0×10^{-10}	1.9×10^{-10}	3.4×10^{-10}
^{120m}I	0.883/hour	1.0	8.7×10^{-11}	1.4×10^{-10}	2.1×10^{-10}
^{121}I	2.12/hour	1.0	2.8×10^{-11}	3.9×10^{-11}	8.2×10^{-11}
^{123}I	13.2/hour	1.0	7.6×10^{-11}	1.1×10^{-10}	2.1×10^{-10}
^{124}I	4.18/day	1.0	4.5×10^{-9}	6.3×10^{-9}	1.3×10^{-8}
^{125}I	60.1/day	1.0	5.3×10^{-9}	7.3×10^{-9}	1.5×10^{-8}
^{126}I	13.0/day	1.0	1.0×10^{-8}	1.4×10^{-8}	2.9×10^{-8}
^{128}I	0.416/hour	1.0	1.4×10^{-11}	2.2×10^{-11}	4.6×10^{-11}
^{129}I	1.57×10^{7}/year	1.0	3.7×10^{-8}	5.1×10^{-8}	1.1×10^{-7}
^{130}I	12.4/hour	1.0	6.9×10^{-10}	9.6×10^{-10}	2.0×10^{-9}
^{131}I	8.04/day	1.0	7.6×10^{-9}	1.1×10^{-8}	2.2×10^{-8}
^{132}I	2.30/hour	1.0	9.6×10^{-11}	2.0×10^{-10}	2.9×10^{-10}
^{132m}I	1.39/hour	1.0	8.1×10^{-11}	1.1×10^{-10}	2.2×10^{-10}
^{133}I	20.8/hour	1.0	1.5×10^{-9}	2.1×10^{-9}	4.3×10^{-9}
^{134}I	0.876/hour	1.0	4.8×10^{-11}	7.9×10^{-11}	1.1×10^{-10}
^{135}I	6.61/hour	1.0	3.3×10^{-10}	4.6×10^{-10}	9.3×10^{-10}

[a]ICRP (1994a)
[b]ICRP (1994a) calculated inhalation dose coefficients for particles with AMAD of 1 or 5 μm.
[c]Fractional absorption factor used by ICRP (1994, Annexes E and F) to calculate effective dose coefficients.

ALI = annual limits on intake; AMAD = activity median average diameters; Ci = curies